

## **Claims**

1. In a fuel cell, an oxygen electrode including a cathode active material having oxygen storage capacity comprising:

a manganese oxide redox couple which provides for said oxygen storage capacity via reduction/oxidation between two different manganese oxide valency states.

2. The fuel cell oxygen electrode of claim 1, further including a hydrophobic component.

3. The fuel cell oxygen electrode of claim 2, wherein said hydrophobic component comprises polytetrafluoroethylene (PTFE).

4. The fuel cell oxygen electrode of claim 3, wherein said PTFE is at least one of:

- a) intimately mixed with said cathode active material;
- b) graded within said cathode active material; or
- c) a separate layer incorporated within said oxygen electrode.

5. The fuel cell oxygen electrode of claim 1, further including a current collector extending within said active material.

6. The fuel cell oxygen electrode of claim 5, wherein said

current collector comprises an electrically conductive mesh, grid, foam, expanded metal, or combinations thereof.

7. The fuel cell oxygen electrode of claim 1, further including a catalytic carbon component.

8. In a fuel cell, said fuel cell including a cathode active material having oxygen storage capacity comprising:

a manganese oxide redox couple which provides for said oxygen storage capacity via reduction/oxidation between two different manganese oxide valency states.

9. The fuel cell of claim 8, wherein said oxygen storage capacity provides said fuel cell with instant startup capability.

10. The fuel cell of claim 8, wherein said oxygen storage capacity provides said fuel cell with the ability to accept recaptured energy by running in reverse as an electrolyzer.

11. The fuel cell of claim 8, wherein said oxygen electrode further includes a hydrophobic component which comprises polytetrafluoroethylene.

12. The fuel cell of claim 8, wherein said oxygen electrode

further includes a current collector extending within said active material.

13. The fuel cell of claim 12, wherein said current collector comprises an electrically conductive mesh, grid, foam or expanded metal.

14. The fuel cell of claim 8, wherein said oxygen electrode further includes a catalytic carbon component.

15. The fuel cell of claim 8, wherein said fuel cell further includes a hydrogen electrode, said hydrogen electrode including an anode active material having hydrogen storage capacity.

16. The fuel cell of claim 15, wherein said hydrogen storage capacity additionally provides said fuel cell with instant startup capability.

17. The fuel cell of claim 16, wherein said hydrogen storage capacity additionally provides said fuel cell with the ability to accept recaptured energy by running in reverse as an electrolyzer.

18. The fuel cell of claim 15, wherein said hydrogen storage capacity provides thermal energy to said fuel cell via the heat of

formation of the hydride thereof.

19. The fuel cell of claim 15, wherein said anode active material is a hydrogen storage alloy which does not include noble metal catalysts.

20. The fuel cell of claim 19, wherein said hydrogen storage alloy is selected from the group consisting of Alkaline Earth-Nickel alloys, Rare Earth/Misch metal alloys, zirconium alloys, titanium alloys, and mixtures or alloys thereof.